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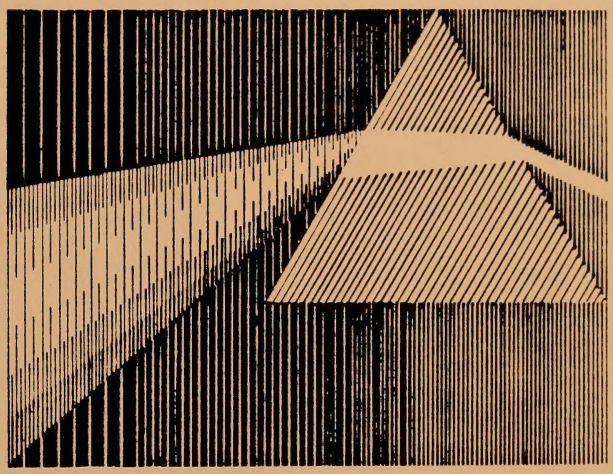
Student Achievement Testing Program Bulletin

Grade 3 Science



1986-87 School Year

Alberta
EDUCATION
Student Evaluation Branch

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This bulletin contains general information about the 1986 Student Achievement Testing Program, and information specific to the Grade 3 Science Achievement Test. Additional copies of this bulletin may be obtained by telephoning Alberta Education at 427-2948.

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September 1986

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PURPOSE OF THE BULLETIN

The Grade 3 Science Achievement Test will be written on June 9, 1987. This bulletin provides a general description of the achievement test, an outline of the objectives to be tested, the test blueprint, and sample questions that demonstrate the nature and complexity of the test items. Attached to the bulletin is the *Grade 3 Science Curriculum Specifications* (revised, July 1984) which presents the specific content and objectives from which the test questions are developed.

Students should have access to the information in this bulletin, particularly to the sample questions.

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Purpose of the Achievement Testing Program

The Achievement Testing Program provides Alberta Education, school jurisdictions, and the public with information significant at the provincial and local levels about student knowledge, understanding, and skills in relation to program objectives. This program is not intended to provide information to be used for student placement or promotion.

The achievement tests are administered on a four-year cycle in four subject areas: language arts, social studies, mathematics, and science; and at three grade levels: 3, 6, and 9.

Nature of the Achievement Testing Program

The achievement tests are specific to the program of studies prescribed by the Minister of Education. Curriculum specifications for each subject area, prepared by the Curriculum Branch and the Language Services Branch of Alberta Education, identify the major content areas, the specific learning objectives within each content area, and the emphasis that each objective is to receive. The test questions reflect these curriculum specifications.

Classroom teachers from across the province are extensively involved in developing and field-testing the questions. The student responses are analysed after field-testing to determine each question's discriminating power and level of difficulty. Questions may undergo several revisions before they appear on the achievement test.

The final draft of each test is examined by an Achievement Test Review Committee that includes representatives of The Alberta Teachers' Association, the Conference of Alberta School Superintendents, Alberta's post-secondary institutions, and Alberta Education.

Students Tested

The results of the Achievement Testing Program are significant at the school jurisdiction level. In most school jurisdictions, total population testing is required to obtain significant results. However, in large school districts, testing with the school as a sample unit is an alternative if a board motion is forwarded to Alberta Education prior to April 1, 1987. Alberta Education will assume total population testing unless a board motion is received.

Exemptions from the Achievement Testing Program

All students who have been taught the subject being tested are expected to participate in the Achievement Testing Program. Any exceptions should be identified by the principal and approved by the superintendent of schools.

The only students who may be excused from participating are those for whom the test is inappropriate. That is, students who

1. are enrolled in an approved program that has been designed for special needs students
2. are being taught the subject that will be tested in another semester or year
3. are enrolled in an English as a Second Language program
4. are being taught the specific subject being tested (mathematics, science, or social studies) in a language other than English

Exemptions for reasons other than those outlined must be approved by the Director of Student Evaluation Branch.

Students Receiving Instruction in French

French language arts achievement tests and French translations of the mathematics, science, and social studies achievement tests are administered for grades 6 and 9 according to the schedule on page 4. School jurisdictions that intend to have their students write achievement tests in French must notify Alberta Education prior to April 1, 1987.

Administration of the Achievement Testing Program

The Achievement Testing Program is administered in accordance with *Examination Regulation 531/82* pursuant to Section 11(1)(g) of the *School Act*. The achievement tests must be administered on the scheduled dates and may not be rescheduled.

The achievement tests should remain unopened until the time of administration. Duplication of any test materials, including the test booklets and answer sheets, is expressly forbidden.

Immediately following the administration of the scheduled achievement tests, the principal must ensure that test booklets and answer sheets are forwarded to school board offices. The school board is responsible for collecting and forwarding to the Student Evaluation Branch all test materials that contain students' responses. Further details regarding procedures for returning these materials to the Branch will be issued when the achievement tests are delivered. For private schools, the Regional Offices of Alberta Education assume the responsibility to collect and forward test materials to the Student Evaluation Branch. All unused testing material may be retained by the school jurisdiction.

Alberta Education will supervise the scoring of all achievement tests. The scoring of achievement tests by school personnel prior to returning test materials to the Student Evaluation Branch is a violation of the Examination Regulations and contrary to the intent of the Achievement Testing Program.

During 1987, the achievement tests will be administered according to the following schedule:

June 9, 1987 (Morning)

Grade 3 Science

Grade 6 Mathematics*

Grade 9 Social Studies*

In 1988, the achievement tests will be administered according to the following schedule:

June 15, 1988 (Morning)

Grade 3 Social Studies

Grade 6 Language Arts

Grade 9 Mathematics*

June 16, 1988 (Morning)

Le français à l'élémentaire - 6^{e} année

*A French translation of this test is available. The French translation must be administered at the same time as the English version.

Reporting the Achievement Test Results

An initial report presenting provincial statistical results for each achievement test will be released in early September 1987. At this time, each jurisdiction will also receive a district profile of student achievement that parallels the provincial statistical report, as well as guidelines for interpreting the jurisdictional results in relation to provincial norms. Each school will receive results for students who wrote at the school, similar in form to the jurisdiction results.

Alberta Education will not issue individual statements of results to students; individual student profiles, however, will appear in the jurisdiction and school reports.

A more detailed report presenting an interpretation of the provincial results will be available in March 1988. This report will provide, along with statistical results, descriptive and evaluative statements about student achievement. Issues for further study will also be identified.

DESCRIPTION OF THE GRADE 3 SCIENCE ACHIEVEMENT TEST

General Description

The time allotted for writing the Grade 3 Science Achievement Test is 50 minutes.

The test consists of 50 multiple-choice questions which are answered on machine-scored answer sheets. The test is divided into two parts of equal length in recognition of the need to provide Grade 3 students with a break. Therefore, each part has 25 multiple-choice questions with a time allocation of 25 minutes.

Students will require HB pencils and erasers.

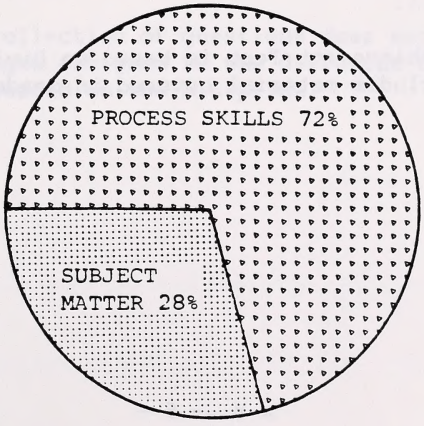
Content of the Test

The four major components of the Division I Science Curriculum and the emphasis that each is to receive according to the *Grade 3 Science Curriculum Specifications* (Revised, August 1984) form the basis for the achievement test. These are:

Component	Emphasis (%)
Process Skills	55
Subject Matter	20
Attitudes	15
Psychomotor Skills	10

The scope of the Grade 3 Science Achievement Test is limited to those objectives that may be efficiently measured on a paper-and-pencil test. While some questions on the test may reflect the psychomotor skills component, basically the process skills and subject matter components of the curriculum are tested. The psychomotor skills and attitudinal components will be reflected in the teacher's evaluation of students.

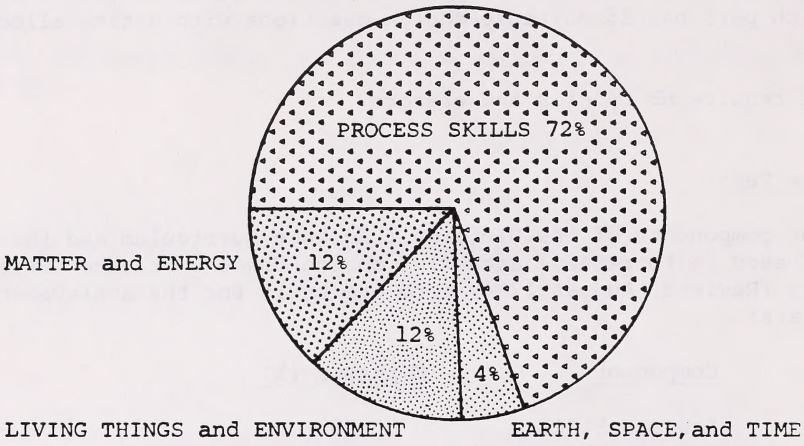
The emphasis given to the process skills and subject matter components is shown in the circle graph below.



The subject matter component includes questions from each theme in the Division I Science core. These themes are listed below.

1. Matter and Energy
2. Living Things and Environment
3. Earth, Space, and Time

The emphasis given to each theme and to the process skills is shown in the circle graph below.



The test questions represent cognitive levels of knowledge, application, and understanding. An explanation of these terms is given in the appendix.

Approximately 20% of the questions test knowledge of subject matter.

Approximately 80% of the questions test application and understanding.

It is assumed that students are familiar with the terminology used in the curriculum specifications (e.g. observing, predicting, measuring, classifying, mass, food chain, etc.).

The Grade 3 Science Achievement Test is based on Division I Curriculum Specifications and includes material covered in grades 1, 2, and 3.

Blueprint for the Achievement Test

Distribution and Per Cent Emphases of Questions

Component	Knowledge		Application		Total	
	Number of Questions	Emphasis (%)	Number of Questions	Emphasis (%)	Number of Questions	Emphasis (%)
Process Skills	7	14	29	58	36	72
Matter and Energy	1	2	5	10	6	12
Living Things and Environment	1	2	5	10	6	12
Earth, Space, and Time	1	2	1	2	2	4
Total	10	20	40	80	50	100

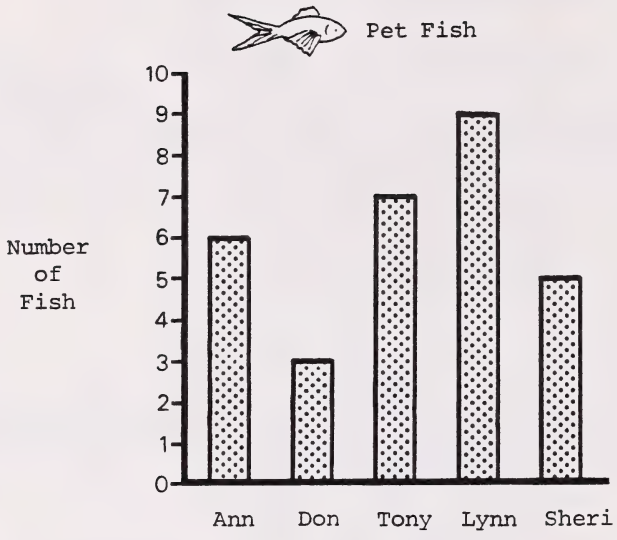
Sample Questions

Sample questions are presented on the following pages. These reflect the nature and complexity of the questions that will appear on the test. The print size approximates the actual size that will be used on the test.

Teachers are encouraged to familiarize their students with the type of questions that will appear on the achievement test by having the students work through the sample questions.

Please note that this collection of questions does not represent the emphasis of the course. The weight assigned to the different curriculum components on the actual test is indicated in the blueprint.

1. Look at the graph.

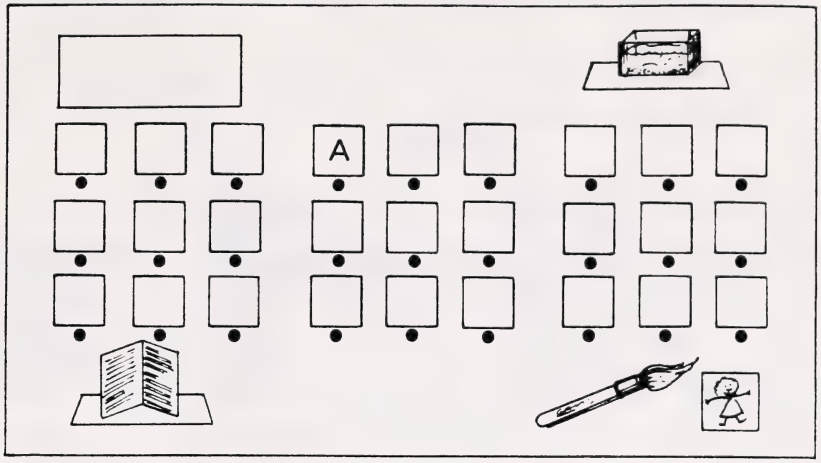


Which student has 2 fish more than Don?

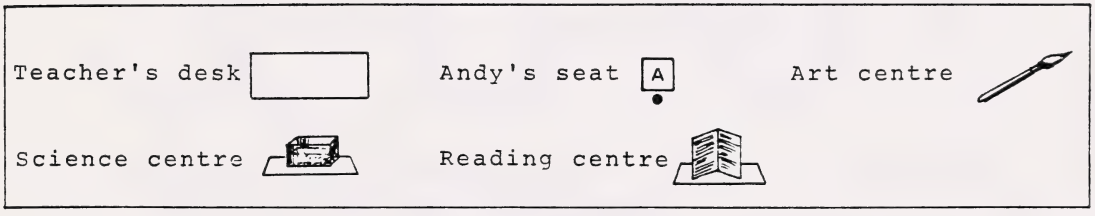
- ○ Ann
- ○ Tony
- ○ Lynn
- ● Sheri

This question requires *application* of the skill of *measuring*.

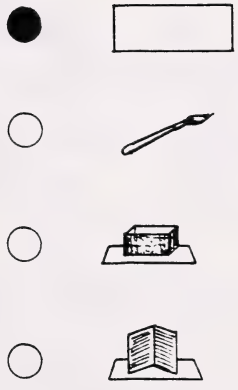
2. Look at the map of Andy's classroom.



These are the symbols used in the map.

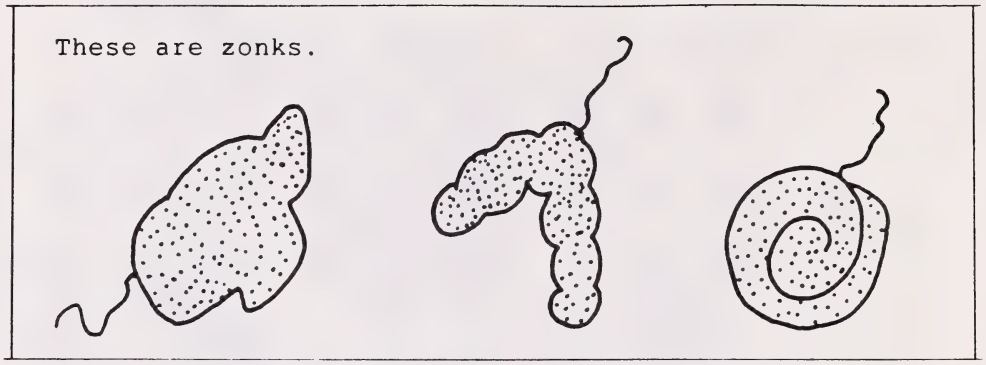


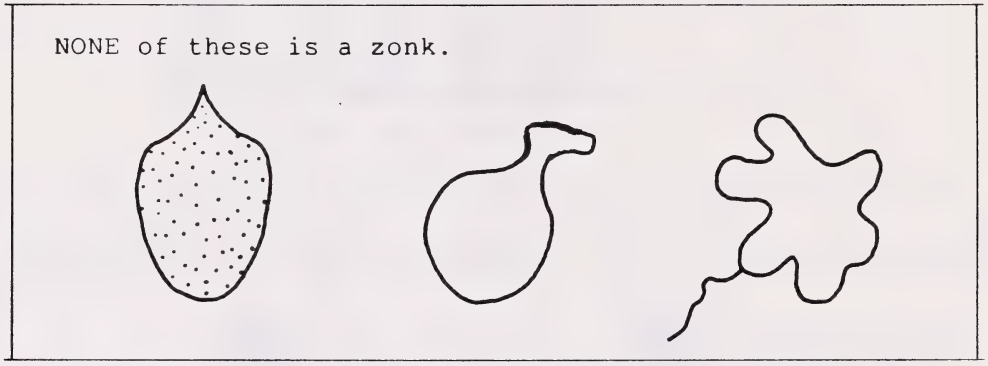
Andy sits closest to



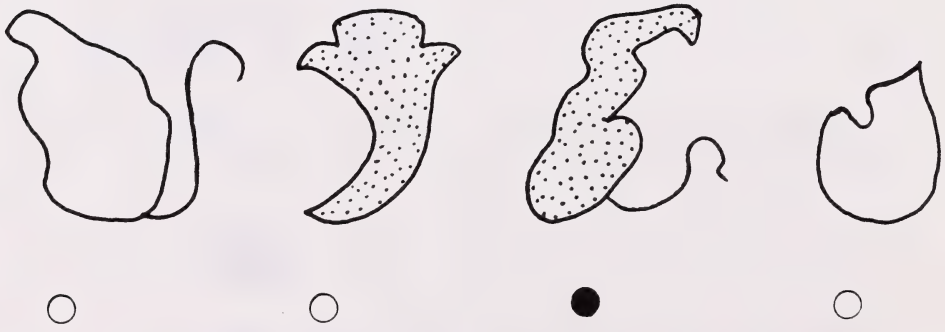
This question requires *application* of the skill of *measuring*.

3. Look at the pictures of make-believe creatures that live in pond water.





Which of these is a zonk?



○ ○ ● ○

This question requires *application* of the skill of *classifying*.

4. The chart shows what four students do after school.

Activity

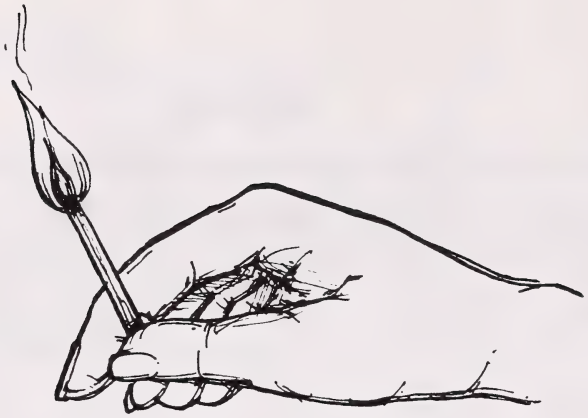
NAME	Piano Lessons	Brownies	Cubs	Swimming
Bob	x		x	
Joan	x			x
Beth		x		x
Jim	x		x	x

What does this chart tell you?

- ○ Both Bob and Jim take piano lessons, belong to Cubs, and go swimming.
- ○ Beth does not go swimming.
- ○ Joan and Beth both belong to Brownies.
- ● Bob, Joan, and Jim all take piano lessons.

This question requires *application* of the skill of *communicating*.

5. Look at the picture.

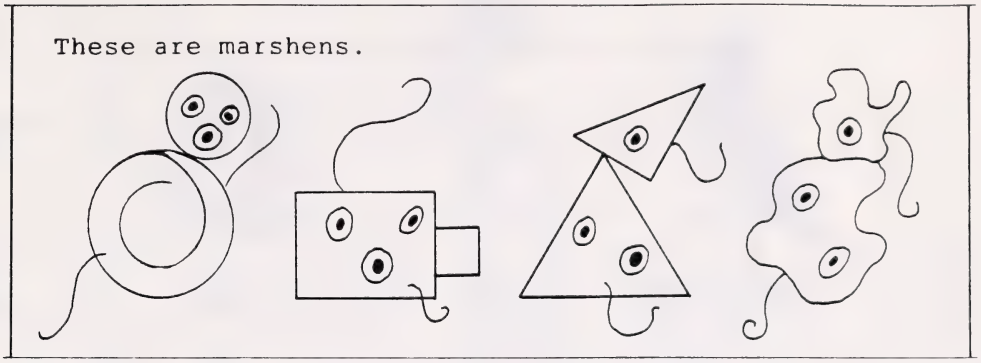


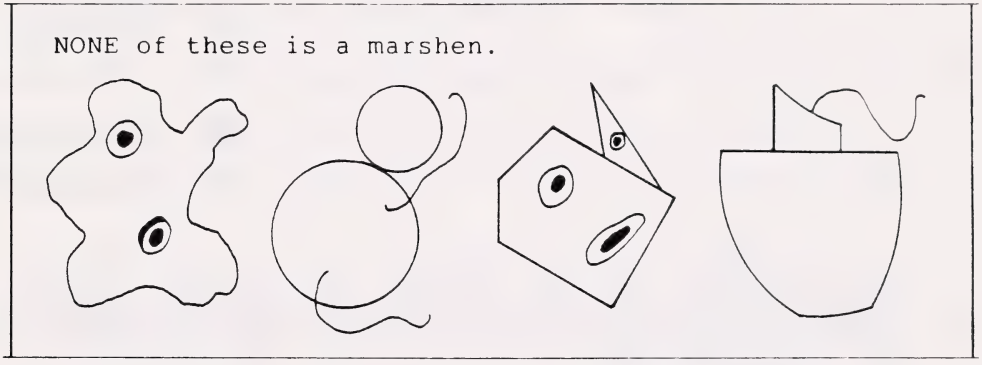
The best OBSERVATION to be made from the picture is that

- ○ someone has just lit a match to light a candle
- ● the hand is holding a match that is burning
- ○ someone is preparing to light a campfire
- ○ the hand is about to be burned by the match

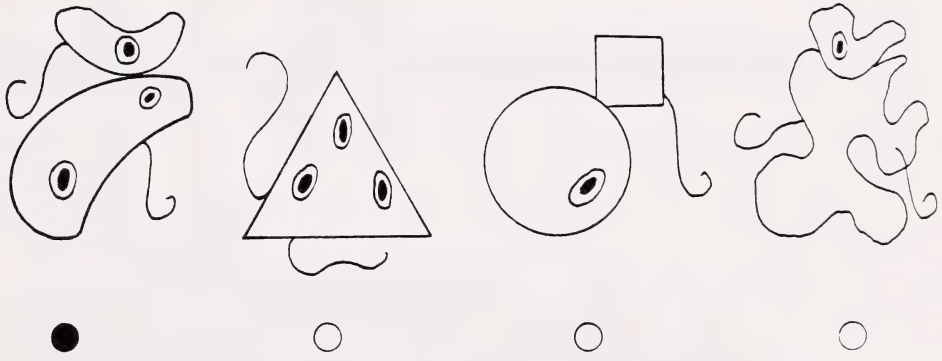
This question requires *application* of the skill of *observing*.

6. Look at the pictures of make-believe animals.





Which of these is a marshen?



● ○ ○ ○

This question requires *application* of the skill of *classifying*.

7. Here are four plants.

fern

daisy

mushrooms

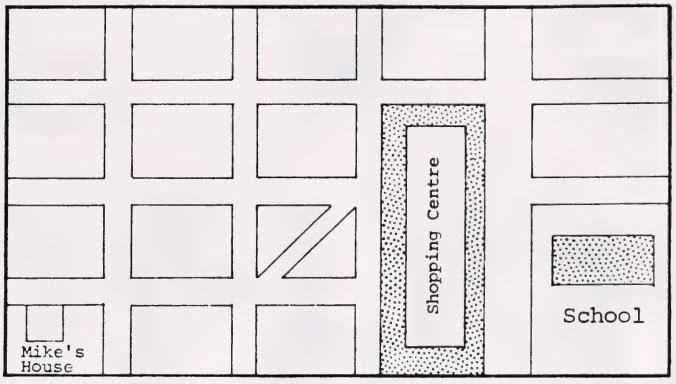
tulip

Which two look the most similar?

- ○ Fern and tulip
- ○ Daisy and mushrooms
- ● Daisy and tulip
- ○ Fern and mushrooms

This question requires *application* of the *plants and animals* topic from *Living Things and Environment* and the *scientific process skill* of *classifying*.

8. Look at the map.



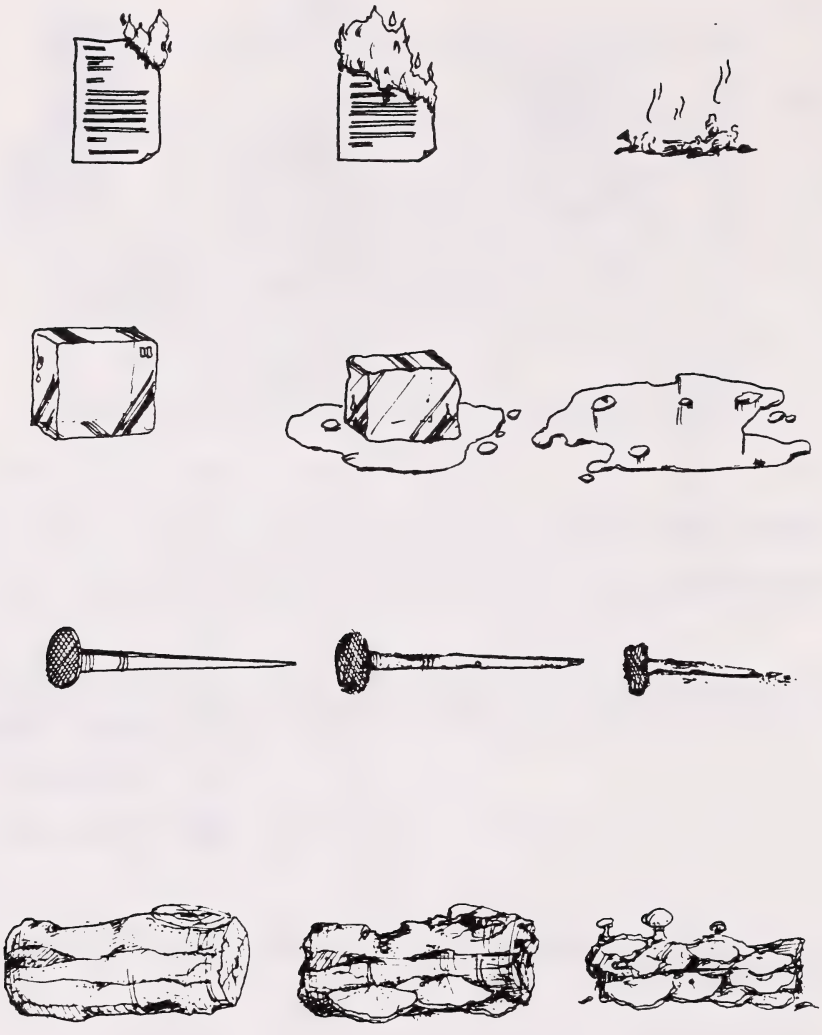
Mike wants to know how far he has to walk to school.

The distance that Mike walks to school is BEST measured in

- ○ centimetres
- ○ pencil lengths
- ○ kilograms
- ● kilometres

This question requires *application* of the *scientific process skill* of *measuring*.

9. The groups of pictures below show different kinds of changes.



Which change would be easiest to change BACK?

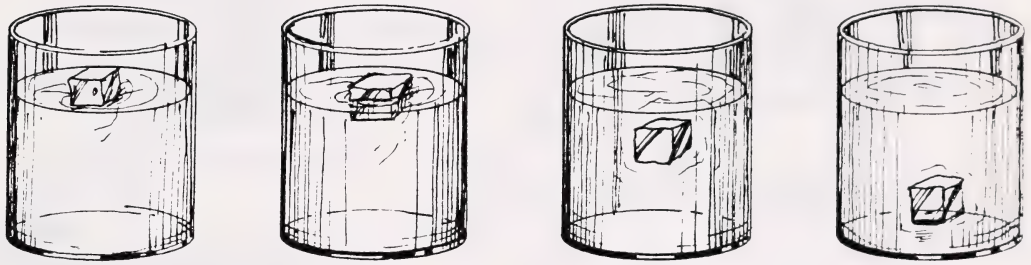
- ● Melting
- ○ Burning
- ○ Rusting
- ○ Rotting

This question requires *knowledge* of the *order and time* topic from *Earth, Space, and Time*.

10. Ice cubes are made by freezing water.

An ice cube is placed in a glass of cold water.

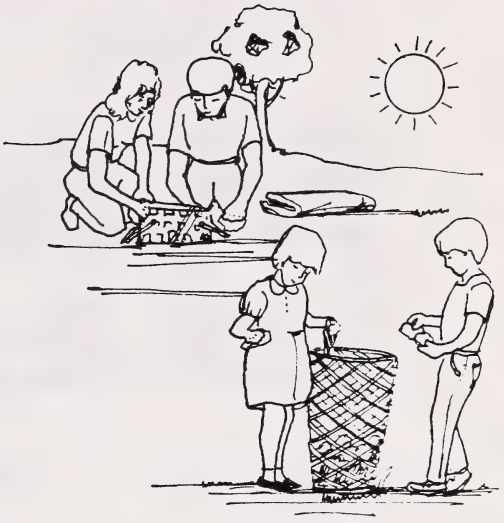
How far will it sink?



○ ● ○ ○

This question requires *knowledge* of the *properties of matter* topic from *Matter and Energy* and the *scientific process skill* of *predicting*.

11. Look at the pictures.



What has happened?

- ○ The children were not helping to pick up the picnic things.
- ○ The family is leaving because rain clouds are coming.
- ● The family has finished eating the picnic lunch.
- ○ The family did not pick up the empty bottles.

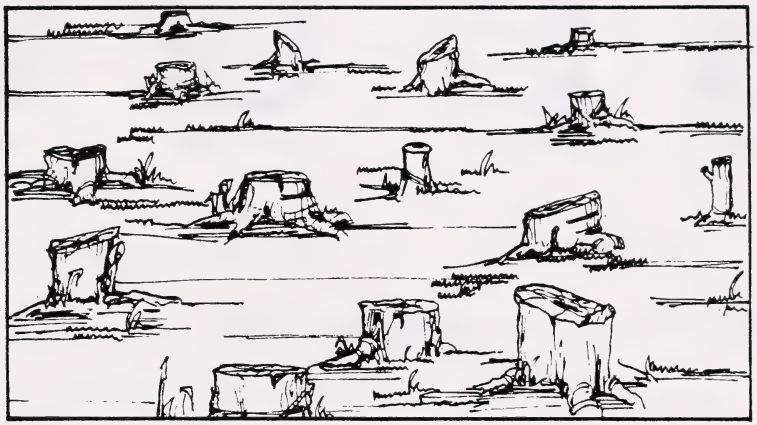
This question requires *application* of the *environment* topic from *Living Things and Environment* and the *scientific process skill* of *inferring*.

12. To change red paint to pink paint, add

- ○ orange paint
- ○ blue paint
- ○ green paint
- ● white paint

This question requires *knowledge* of the *properties of matter* topic from *Matter and Energy* and the *scientific process skill* of *observing*.

13. Mr. Smith cut down trees to build a house.

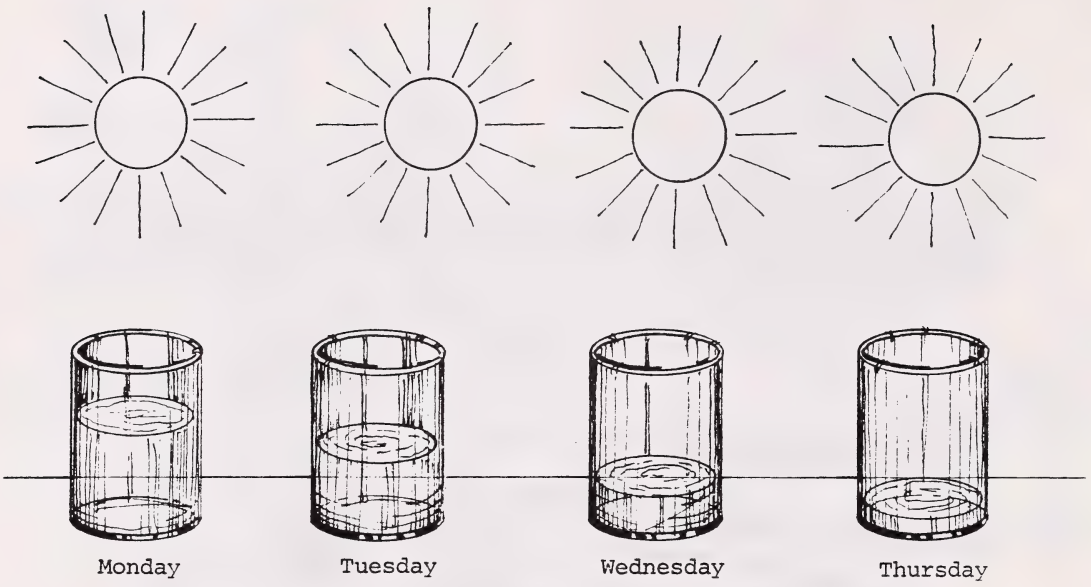


To have trees for the future, Mr. Smith should

- ○ water the land
- ● plant seedlings
- ○ build more houses
- ○ cut down more trees

This question requires *knowledge* of the *environment* topic from *Living Things and Environment* and the *scientific process skill* of *inferring*.

14. Look at these pictures.

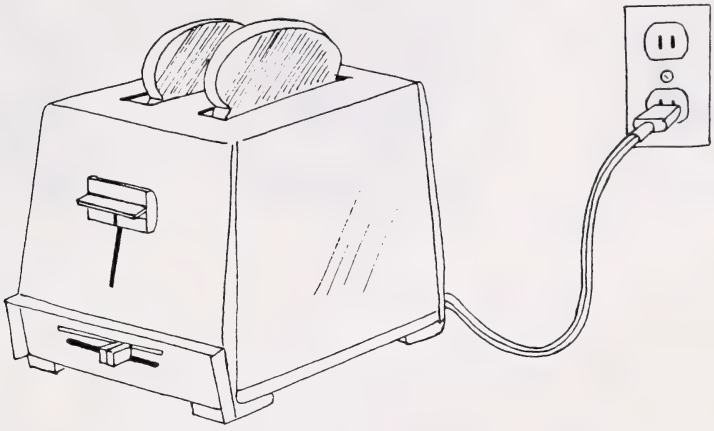


What change is taking place?

- ○ Heating
- ○ Boiling
- ○ Melting
- ● Evaporating

This question requires *knowledge* of the *properties of matter* topic from *Matter and Energy* and the *scientific process skills* of *observing* and *describing*.

15.



What can you observe?

- ○ The toast is for breakfast.
- ○ The toast has just popped up.
- ○ The two slices of bread are warm.
- ● The two slices of bread are in the toaster.

This question requires *application* of the *scientific process skills* of *observing* and *inferring*.

16. Each kind of soup has a different temperature.

chicken
83°C

tomato
89°C

vegetable
85°C

Which is the order from COLDEST to HOTTEST?

- ○ Chicken, tomato, vegetable
- ● Chicken, vegetable, tomato
- ○ Tomato, vegetable, chicken
- ○ Vegetable, tomato, chicken

This question requires *application* of the skill of *measuring*.

APPENDIX A: EXPLANATION OF COGNITIVE LEVELS

1. Knowledge

Knowledge is defined as including those behaviors and test situations that emphasize the remembrance, either by recognition or recall, of ideas, material, or phenomena. This level comprises knowledge of terminology, specific facts (dates, events, persons, etc.), conventions, classifications and categories, methods of inquiry, principles and generalizations, and theories and structures.

2. Application and Understanding

Application requires that the student apply an appropriate abstraction (theory, principle, idea, method) to a new situation.

Understanding refers to responses that demonstrate comprehension of the literal message contained in a piece of communication. This means that the student is able to translate, interpret, or extrapolate. Translation refers to the ability to put a piece of communication into another language. Interpretation involves the reordering of ideas (inferences, generalizations, or summaries). Extrapolation is the ability to make estimates or predictions based on an understanding of trends or tendencies.